REMARKS

The examiner's refusal to consider References AF-AM submitted by applicant with an information disclosure statement on March 1, 2001 was addressed in a transmittal letter filed in the Patent Office on July 31, 2002.

The examiner's objections to the specification have been addressed. Amendments have been made to correct each of the issues raised by the examiner, and the specification has been reviewed for errors. All known errors have been corrected in the amendments made herein.

The examiner has indicated that claims 5-8 and 13-15 would be allowable if rewritten in independent form. Claims 5 and 13 have been rewritten in independent form, and claims 6-8 and 14-15 are dependent on claims 5 and 13, respectively. Accordingly, claims 5-8 and 13-15 are in condition for allowance.

The examiner rejected independent claims 1 and 9 under 35 U.S.C. §102 as anticipated by Schenkel (US 5157659). Although not applied to the independent claims, the examiner has also relied on Shaffer (US 5841778) in rejecting certain dependent claims under 35 U.S.C. §103.

Claims 1-4 and 9-12 have been cancelled, and replaced by new claims 16-19 and 20-23. (The cancellation of these claims is made without prejudice to their subject matter being pursued in a continuation application to be filed during the pendency of this application or a future continuation application.)

The new independent claims (16, 21) are believed to be patentable over Schenkle and Shaffer, and thus the examiner is urged to reconsider and withdraw the rejection.

The invention provides an improved solution to the problem of a lower priority transmission tying up the network for too long a period of time while a higher priority transmission is waiting to begin. The invention solves the problem by dividing a transmission into frames, and checking between frames to determine whether a higher priority transmission is contending for access to the medium. If not, the next frame can be immediately transmitted. If a higher priority transmission is waiting, the lower priority transmission is interrupted.

Both Schenkel and Shaffer attempt to solve the same problem, but go about it in a very different manner. Rather than dividing a transmission into frames, and checking between frames

for a contending transmission, the references introduce a collision to force the current transmission to abort.

Schenkel describes how collisions, which are normally regarded as something to be avoided, are purposely used to allow the lower priority station to gain access to the medium:

> Rather than attempting to avoid collisions, collisions are purposely introduced by a bus clearing signal which defines the beginning of a frame in which the highest priority signals immediately follow, followed by lower priority signals. The bus clearing signals, in inducing collisions with signals transmitted from stations using the AADACP protocol, thus causes termination of the transmission of lower priority signals and both clears the bus and prepares it for carrying highest priority signals.

Shaffer takes the same approach, but instead of using special bus clearing signals to cause collisions, it has the contending higher priority station initiate a transmission to cause the collision and thereby clear the medium.

> One prior art solution to this problem is to allow users to transmit high priority information regardless of whether a carrier signal from any other stations is present. Using this scheme, when a high priority user desires to transmit a message, the high priority user forces a collision on the line. When the collision is detected, and the transmissions aborted, the high priority user uses a shorter backoff time than the one agreed upon in the CSMA/CD standard, effectively bumping low priority traffic in all cases. However, this method works properly only when the network utilization is low. When loads are heavy, the low priority messages might never complete their transmissions from constantly being bumped by higher priority messages.
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> The present invention provides a modification to the CSMA/CD protocol, or any other contention-based local area network (LAN) protocol, that provides a more efficient allocation of network resources.
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> When loads are heavy, it is desirable to allow the computing element to force a collision and bump a frame only if relatively few bytes of the

frame have been transmitted. If more then a predetermined number of bytes have already been transmitted, the high priority frame will wait until the low priority transmission is successfully completed in order to avoid having to retransmit a long frame.

The Schenkel and Shaffer approaches to the problem are strikingly different from that of the invention as expressed in the new independent claims. Schenkel and Shaffer force a collision, and all of the inefficiencies that thereby result. The invention, by contrast, provides an efficient, orderly technique for giving access to the higher priority transmission.

Accordingly, new independent claims 16 and 21 are in condition for allowance.

New dependent claims 17-20 and 22-25 are all properly dependent on one of the new independent claims, and thus allowable therewith. Each of the dependent claims adds one or more further limitations that enhance patentability, but those limitations are not presently relied upon. For that reason, and not because applicants agree with the examiner, no rebuttal is offered to the examiner's reasons for rejecting dependent claims.

Allowance of the application is requested.

Attached is a marked-up version of the changes being made by the current amendment.

Enclosed is an $84 check for excess claim fees and a $400 check for the Petition for Extension of Time fee. Please apply any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

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Version with markings to show changes made

In the specification:

Paragraph beginning at page 8, line 16 has been amended as follows:

-- During a data transmit process, data and control information are received at the PHY-to-MAC interface (MAC interface) 74 over the PHY-to-MAC bus 24. The MAC interface provides the data to the scrambler 32, which ensures that the data as presented to the input of the data FEC encoder 34 are substantially random in pattern. The data FEC encoder 34 encodes the scrambled data pattern in a forward error correction code and subsequently interleaves the encoded data. Any forward error correction code, for example, a Reed-Solomon, or both a Reed-Solomon code and a convolution code, can be used for this purpose. The modulator 36 reads the FEC encoded data and FEC encoded control information from the frame control FEC encoder 38, and modulates the encoded data and control information onto carriers in OFDM symbols in accordance with conventional OFDM modulation techniques. Those modulation techniques may be coherent or differential. The modulation mode or type may be Binary Phase Shift Keying with [□] 1/2 rate coding ("[□] [□] 1/2 BPSK[□]"), Quadrature Phase Shift Keying with [□] 1/2 rate coding ("[□][□] 1/2 QPSK[□]"), QPSK with 3/4 rate coding ("[□]3/4 QPSK[□]"), among others. The IFFT unit 42 receives input from the modulator 36, the frame control FEC encoder 38 and synchronization signal generator 40, and provides processed data to post IFFT functional units (not shown), which further process the contents of the frame before transferring it to the AFE unit 26 (from FIG. 1). --

Paragraph beginning at page 11, line 5, has been amended as follows:

-- For purposes of simplification and clarity, other details of the PHY unit[□]'s transmitter/receiver functional units (which are known to those skilled in the art and not pertinent to the invention) have been largely omitted herein. --

Paragraph beginning at page 11, line 8 has been amended as follows:

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-- Referring to FIG. 3, a format of a data transmission frame 80 to be transmitted over the transmission medium 14 by the transmitting network station 12a is shown. The data transmission frame 80 includes a payload 82, which carries the data received from the MAC unit 18. This data includes a header 84, body 86 and frame check sequence (FCS) 88. Preferably, the payload 82 is transmitted and received by the functional units illustrated in FIG. 2 in accordance with techniques described in co-pending U.S. Patent Application Serial No. 09/455,186, entitled "[□]Forward Error Correction With Channel Estimation,[□]" in the name of Lawrence W. Yonge III et al., co-pending U.S. Patent Application Serial No. 09/455,110, entitled "[□]Enhanced Channel Estimation,[□]" in the name of Lawrence W. Yonge III et al., and co-pending U.S. Patent Application Serial No. 09/377,131, entitled "[□]Robust Transmission Mode[□]", in the name of Lawrence W. Yonge III et al., all of which are incorporated herein by reference; however, other techniques may be used. The aforementioned U.S. Application Serial No. 09/377,131 ("Robust Transmission Mode") describes a standard mode and a reduced data rate robust mode (hereinafter, simply referred to as "ROBO mode"), the ROBO mode providing for extensive diversity (in time and frequency) and data redundancy to improve the ability of the network stations to operate under adverse conditions. --

Paragraph beginning at page 13, line 13 has been amended as follows:

-- The first frame control field 98, the second frame control field 102 and the third frame control field 124 are produced by the frame control FEC encoder 38 in conjunction with the modulator 36 based on control information received from the MAC unit 18. Generally, the frame control fields 98, 102 and 124 include information used by all stations in the network for channel access, and, in the case of frame control field 98, information used by the destination for receiver demodulation. Because the frame control fields 98, 102 and 124 are intended to be heard by all stations, it is desirable for the frame control fields 98, 102 and 124 to have a robust form of physical layer encoding and modulation. Preferably, they are protected from transmission errors by a block code enhanced with time and frequency domain interleaving, as well as redundancy, in accordance with techniques described in a co-pending U.S. application Ser. No.[___ (Attorney Docket 04838/050001)] 09/574,959, now issued U.S. Patent No. 6,289,000, entitled "Frame Control Encoder/Decoder for Robust OFDM Frame Transmissions,"

in the name of Lawrence W. Yonge III, incorporated herein by reference, although other techniques may be used. --

In the claims:

Claims 1-4 and 9-12 have been cancelled.

Claims 5 and 13 have been amended as follows:

-- 5. (Amended) [The method of claim 4,] A method of bounding latency of transmissions by stations on a shared access medium comprising:

associating one of multiple priority levels with a transmission; and

controlling the amount of time the transmission occupies the shared access medium based on the associated priority level,

wherein the transmission is a burst transmission of frames and wherein controlling comprises:

providing the burst transmission with control of the medium at the associated priority level, and

wherein providing comprises: providing in all but the last of the frames in the burst transmission a contention control indicator for indicating contention-free access and providing in all of the frames in the burst transmission the associated priority level so that the burst transmission may be interrupted by another of the stations having a pending frame with a higher priority level than the associated priority level. --

-- 13. (Amended) [The medial access control unit of claim 12,] A media access control unit for bounding latency of transmissions by stations on a shared access medium comprising:

a transmit handler to associate one of multiple priority levels with a transmission and to control the amount of time the transmission occupies the shared access medium based on the associated priority level,

wherein the transmission is a burst transmission and the transmit handler comprises:

a segmentation unit for segmenting a MAC service data unit into segments for transmission in frames on the shared access medium in the burst transmission; and

a frame transmit unit for providing segments in frames in the burst transmission at the associated priority level, and

wherein the frame transmit unit provides a set contention control indicator for indicating contention-free access in all but the last of the frames in the burst transmission and provides in all of the frames in the burst transmission the associated priority level so that the burst transmission may be interrupted by another of the stations having a pending frame with a higher priority level than the specified priority level. --